Digital Communications

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Office: Duncan Hall 2017

Office Hours:
Tuesday, Thursday 11:00-11:45am
Monday, Wednesday 1:00-2:00pm

Class Hours:
Tuesday, Thursday 9:25-10:40am
Room DH 1064

Spring Semester, 2014

This is an undergraduate course in digital communications, which is designed to prepare students for engineering work in high-tech industries and for graduate work in communications, signal processing, and computer systems. The course covers basic concepts and useful tools for design and performance analysis of transmitters and receivers in the physical layer of a communication system.

Prerequisite: An introductory course in probability (e.g. Elec 303). A course in signals and systems (e.g. Elec 301).

Textbook: J.G. Proakis, M. Salehi, *Communication Systems Engineering, 2nd Edition*

ELEC 430 Timetable

Homework	Due Date
HW #1	January 19
HW #2	January 26
HW #3	February 2
Exam 1 (take home)	February 8-10
HW #4	February 16
Spring Break	February 28, March 1
HW #5	March 8
HW #6	March 15
Spring Recess	March 22
Exam 2 (take home)	March 28-30
HW #7	April 5
HW #8	April 12
Project presentation	April 17
Exam 3 (take home)	April 18-20

HW's 25% + 1st exam 25% + 2nd exam 25% + 3rd exam 25% = 100%

Homework assignments are due by 5:00pm on their due dates. You can be one day (24 hours) late on two HW sets without any penalties. Otherwise there is a 50% penalty on late HW assignments.

Honor code: You are encouraged to work *with* other students in Elec 430 on homework problems. You should not look at completed work of other students, old homework solutions, and old exams and their solutions.

Course Outline

1. Overview	1 Lect. (4 pages)
2. Review of Probability Theory	1 Lect. (7 pages)
2.1. Random variables	
2.2. Distributions	
2.3. Moments	
3. Introduction to Stochastic Processes	4 Lect. (17 pages)
3.1. Definitions, distributions and stationarity	
3.2. Second order descriptions	
3.3. Linear filtering	
3.4. Gaussian processes	
4. Data Transmission and Reception	7 Lect. (40 pages)
4.1. Signaling	
4.2. Demodulation and detection	
5. Digital Transmission over Baseband Channels	2 Lect. (9 pages)
5.1. Pulse Amplitude Modulation (PAM)	
5.2. Pulse Position Modulation (PPM)	
6. Digital Transmission over Passband Channels	6 Lect. (30 pages)
6.1. Carrier amplitude modulation	
6.2. Carrier phase modulation (BPSK, DPSK, etc.)	
6.3. Carrier frequency modulation (FSK, MSK, etc.)	
6.4. Quadrature amplitude modulation (QAM)	
7. Information Theory and Coding	8 Lect. (58 pages)
7.1. Entropy and source coding	
7.2. Channel capacity	
7.3. Channel coding	